Total Harvestable Species Richness

These EnviroAtlas national maps display the number of total harvestable species based on potential habitat within each 12-digit hydrologic unit (HUC) in the conterminous United States. These data are based on habitat models rather than wildlife counts. Potential habitat may be specific to wintering, breeding, or year-round activities depending on the species.

Why are harvestable species important?

The metric total harvestable species encompasses big game, small game, waterfowl, and fur-bearer species. Harvestable species richness estimates the number of species inhabiting potential habitat that may be hunted or trapped. Harvestable species include elk, deer, grouse, rabbits, turkeys, ducks, and geese. Species richness is one measure of biodiversity that can represent the relative conservation value of a particular area. Many scientists believe that biodiversity, because it represents all forms of life on earth, provides or supports the core benefits that humans derive from their environment to sustain human society, economy, health, and well-being. Managing for biodiversity is one way to balance competing demands for ecosystem services.[1]

Each species plays an important role within its ecosystem. Harvestable species serve as both predators and prey in a food chain; a balance among primary and secondary consumers is an important element in maintaining self-sustaining ecosystems. Grazers and browsers, such as elk and deer, directly modify the species composition and condition of grassland and forest habitats. Small game species disperse plant seeds, which can influence the distribution of (both native and non-native) plant species. Top predators, by regulating herbivore numbers, indirectly influence habitat condition by reducing grazing pressure on plant production. A predator-prey balance helps to maintain plant and animal species diversity.[2] In the absence of large predatory species, such as wolves and cougar, the harvesting of large and small game by humans becomes a substitute for natural predator control.

In addition to their roles in ecosystems, harvestable species are appreciated for providing aesthetic value and recreational opportunities. The chance to see wildlife attracts visitors to parks and other wildlife management areas. Many of these species also serve as an important food source. The harvesting of these species provides an economic benefit for conservation, management, and restoration projects, the benefits of which extend far beyond harvestable species. The

Photo: White-tailed Deer, USFWS

total economic impact of hunting for 2015 was $78 billion. Hunting expenditures were $33 billion for that same time period. The U.S. Fish and Wildlife Service estimated that one-third of what hunters spent in 2011, went towards accommodations, transportation, and other tourism-related activities.[3] In 2013, the U.S. Fish and Wildlife Service appropriated over $522 million for states to use for wildlife conservation and restoration purposes.[4] This revenue comes from a federal excise tax placed on hunting equipment, and it is used to support conservation efforts, land acquisition, and wildlife restoration projects.

How can I use this information?

Three EnviroAtlas maps, Mean, Maximum, and Normalized Index of Biodiversity (NIB), illustrate Total Harvestable Species Richness within each 12-digit HUC across the conterminous United States.[5] Used together or independently, these maps can help identify areas of potentially low or high total harvestable species richness to help inform decisions about resource restoration, use, and conservation. Mean richness is a commonly used and understood value for comparison. NIB provides an index to compare a metric with other metrics across multiple project scales simultaneously. Maximum richness identifies areas that are species rich but may not occupy large areas (e.g. linear riparian areas).

These maps can be used in conjunction with other EnviroAtlas maps such as ecoregions, the U.S. Geological Survey (USGS) protected areas database (PAD-US), or the USGS Gap Analysis Project (GAP) ecological systems to identify areas with high ecological or recreational value for conservation,

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recreation, or restoration planning. After learning the total harvestable species richness values for a particular 12-digit HUC (click on a HUC area to see the popup), users can investigate an area more intensively by increasing the transparency to view aerial imagery beneath. Individual species models are also available from the GAP project.

How were the data for this map created?

The USGS GAP project maps the distribution of natural vegetation communities and potential habitat for individual terrestrial vertebrate species. These models use environmental variables (e.g., land cover, elevation, and distance to water) to predict habitat for each species. GAP modeled habitat for harvestable species that reside, breed, or use the habitat within the conterminous U.S. for a significant portion of their life history. This map is based on a subset of GAP species identified as harvestable species. The map was derived from 185 GAP modeled species identified as harvestable species by state wildlife agencies combined to calculate richness by pixel. The mean and maximum numbers of Harvestable Species in each 30-meter pixel were calculated for each 12-digit HUC. The mean species richness value by HUC was divided by the maximum mean value within all HUCs to calculate the NIB.

What are the limitations of these data?

EnviroAtlas uses the best data available, but there are still limitations associated with the data. These data, based on models and large national geospatial databases, are estimations of reality that may overestimate actual harvestable species presence. Modeled data are intended to complement rather than replace monitoring data. Habitat models do not predict the actual occurrence of species, but rather their potential occurrence based on their known associations with certain habitat types. Habitat is only one factor that determines the actual presence of a species. Other factors include habitat quality, predators, prey, competing species, and fine scale habitat features.

Other essential species information in addition to species richness includes the types of species and their functional groups, whether they are rare or common, native or non-native, tolerant or intolerant of disturbance. It is also important to consider that species numbers (at a landscape scale) tend to increase with moderate disturbance, meaning that moderately human-altered or disturbed habitats have higher numbers of species than either minimally disturbed or highly disturbed sites.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. Individual 30-meter pixel data may be downloaded from the New Mexico State University Center for Applied Spatial Ecology.

Where can I get more information?

A selection of resources related to harvestable species and biodiversity is listed below. Information on the models and data used in the USGS Core Science Analytics, Synthesis & Library's GAP project is available on their website. For additional information on how the data were created, access the metadata for the data layer from the layer list drop down menu. To ask specific questions about this data layer, please contact the EnviroAtlas Team.

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Selected Publications

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2. Miller, B., B. Dugelby, D. Foreman, C. Martinez del Rio, R. Noss, M. Phillips, R. Reading, M. E. Soulé, J. Terborgh, and L. Wilcox. 2001. The importance of large carnivores to healthy ecosystems. *Endangered Species Update* 18(5):202–210.

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4. U.S. Fish and Wildlife Service. 2013. Certificate of the Apportionment of the Appropriation of the Pittman-Robertson Wildlife Restoration. FWS/AWSRJAIM:054057. Accessed April 2020.

5. Kepner, W.G., K.G. Boykin, D.F. Bradford, A.C. Neale, A.K. Leimer, and K.J. Gergely. 2013. Biodiversity metrics fact sheet, EPA/600/F-11/006, U.S. Environmental Protection Agency, Washington, D.C.